Using cold-water coral mini-mounds as analogue for giant mound growth: assessment of environmental drivers and anthropogenic impact

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Abstract

Cold-water coral (CWC) reefs are formed by framework building scleratinians *Lophelia pertusa* and *Madrepora oculata* that baffle sediment and over time, have the potential to develop into large coral mounds of up to 300m high (e.g. Belgica Mound Province). The detailed mechanisms of initiation and build-up of such large CWC mounds are however not yet fully understood. It is therefore essential to study smaller mounds (often termed "mini-mounds") that can be interpreted as earlier growth stages that haven't had the time to coalesce and develop into larger mounds. The FWO Minimound project (2013-2017) aims to investigate CWC mini-mounds within the Bay of Biscay in order to determine the impact of: (1) palaeoceanographic changes related to glacial-interglacial climate change in the last 15 ka, (2) hydrocarbon seepage processes and (3) anthropogenic fishing activities on CWC habitats.
The project targets three minimound provinces: the Ferrol Canyon (Cantabrian Margin), the Guilvinec Canyon (Armorican Margin) and the Explorer and Dangeard Canyons (Celtic Margin). These mini-mounds are fossil and occur at relative shallow depths on the interface between the Eastern North Atlantic Central Water (ENACW) and the Mediterranean Outflow Water (MOW). Contrastingly, most living CWC reefs in this region of the Atlantic, dwell in the deeper MOW depth range, relying on the density and dynamics of this water mass for their food supply. In order to investigate the initiation, growth and demise of CWC mini-mounds, 35 m of USBL guided sediment cores were retrieved from the Explorer and Dangeard Interfluves. We present data of sedimentological, geochemical and palaeoceanographic analyses throughout the cores, coupled with high-resolution geophysical data. Preliminary results indicate that coral growth initiation is associated with a strong shift in sedimentation regime potentially linked to climate driven palaeoceanographic changes of the MOW-ENACW interface.

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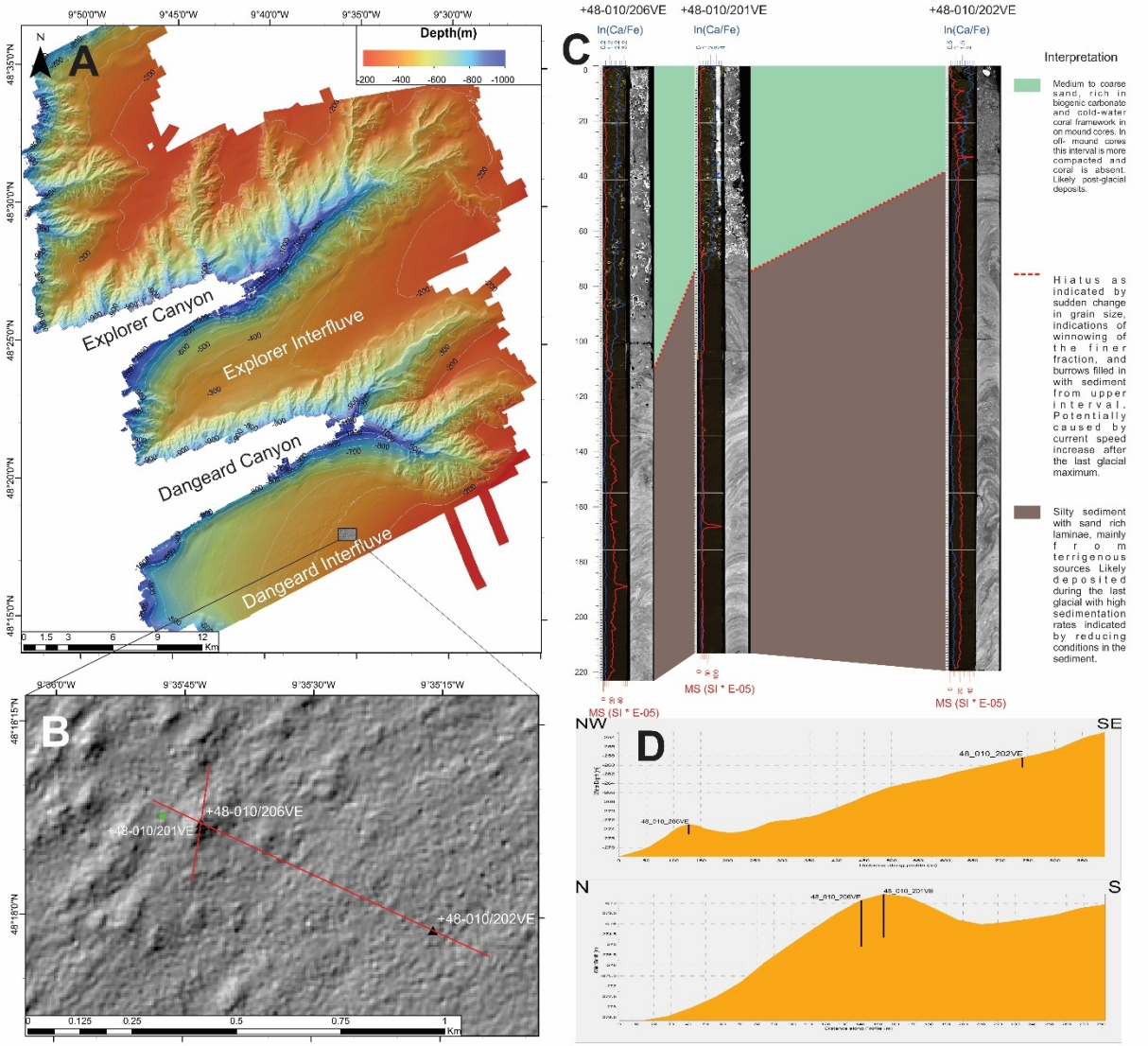

Figure. A: Multibeam bathymetry map of the Explorer and Dangeard Canyons on the Celtic Margin; B: Hill shaded detail of the cored mounds (black triangles) and indications for profiles (red lines); C: Preliminary correlation of sediment cores with core images, CT scans, XRF log-ratios of Ca/Fe (in blue) and magnetic susceptibility (in red); D: bathymetry profiles over the cored mounds.